		NTSB ID: LAX95FA076		Aircraft Registration Number: N746FE	
		Occurrence Date: 01/11/1995		Most Critical Injury: Fatal	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place FLAGSTAFF		State AZ	Zip Code 86001	Local Time 1805	Time Zone MST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility: 2		Direction From Airport: 165	
Aircraft Information Summary					
Aircraft Manufacturer CESSNA		Model/Series 208B		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>HISTORY OF FLIGHT</p> <p>On January 11, 1995, about 1805 hours mountain standard time (mst), a Cessna 208B, N746FE, operated by Empire Airlines, Inc. as flight number 7551, collided with terrain, about 1.5 nautical miles (nm) south of the Flagstaff Pulliam Airport, Flagstaff, Arizona. The accident occurred while the pilot was attempting to return to the airport after taking off from runway 21. The airplane was transporting cargo under contract with Federal Express during the dark nighttime air taxi flight. Instrument meteorological conditions prevailed, and an instrument flight plan was filed. The airplane was destroyed, and the airline transport pilot was fatally injured.</p> <p>Prior to taking off on the accident flight, the airplane was partially refueled, and it was loaded with cargo. The scheduled block out time was 1800.</p> <p>At 1746, the local air traffic controller cleared N746FE (using radio call sign "Empire five fifty-one") to taxi for takeoff. The pilot indicated that he desired to fly under instrument flight rules to Phoenix, Arizona. A few minutes later, the controller informed the pilot that his departure would be delayed because air traffic was busy.</p> <p>At 1801:56 the controller cleared N746FE for takeoff. The controller reported to the National Transportation Safety Board that he estimated the airplane became airborne about 3,000 feet down the runway. Nothing unusual was noted.</p> <p>Another pilot, who was waiting for takeoff in a Beech King Air near the approach end of runway 03, reported that when the accident airplane passed over the departure end of runway 21, it had climbed 200 to 300 feet above the runway's surface. Nothing unusual was noted except that the airplane "did not seem to be climbing very well." The Beech pilot further reported that the airplane commenced turning left approximately 1/4 to 1/2 mile beyond the end of the runway. The rate of turn "seemed normal and not excessive."</p> <p>At 1803:50 the controller instructed N746FE to contact Albuquerque Center, and three seconds later the pilot acknowledged the instruction.</p> <p>Then, at 1803:57 the pilot stated "Five fifty-one's coming back in," which was followed 6 seconds later with "I'm coming back to the airport."</p> <p>The controller asked the pilot if he had the airport in sight. The pilot replied at 1804:12 with the following brief statement: "No but I've got to get back." The controller then stated "OK Empire five fifty-one say nature of difficulty please." The pilot's reply was unintelligible. At 1804:25 the controller stated "Empire five fifty-one your not in sight cleared to land either runway."</p>					
FACTUAL REPORT - AVIATION					

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**FACTUAL REPORT****AVIATION**

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**Narrative (Continued)**

The Beech King Air pilot provided the following account of his observations regarding the accident airplane's flight path:

After taking off, the airplane initially flew straight ahead, but then commenced a left 180-degree turn to an approximate heading of 030 degrees to parallel the runway. "The rate of turn seemed normal and not excessive (and the airplane) . . . did not seem to be climbing and may have even been descending." The Beech pilot further reported that the airplane "did not appear to be stalled or wobbling when last seen." The Beech pilot said that he lost sight of the airplane's lights when it descended behind trees. The crash site was located in a snow-covered hilly forest, approximately 6,500 feet south-southeast of the runway's departure end.

A Federal Express ramp agent, who was located at the airport, also observed the airplane depart. The agent indicated that the airplane passed "overhead (by) approximately 100 to 120 feet" and was climbing. The airplane then entered a left bank turn, lost altitude, and disappeared over a tree line.

**PERSONNEL INFORMATION**

The pilot held an airline transport pilot certificate, with single and multiengine land ratings, a multiengine sea rating, and several type ratings. The pilot also possessed a certified flight instructor certificate for single and multiengine airplanes which was last renewed in April of 1994.

Empire Airlines (the operator) hired the pilot in March of 1990. In April of 1993, the FAA approved the pilot to serve as a check airman in the Cessna 208. The pilot was authorized to give proficiency and line checks to the operator's pilots.

In March, 1994, the pilot completed recurrent academic and simulator training by Flight Safety International. In October, 1994, the pilot successfully completed a 1.4-hour-long flight competency check in the Cessna 208, which included normal and emergency procedures.

By the accident date, the pilot had logged about 10,000 hours of total flight time, of which about 2,000 hours were logged flying the Cessna 208 series airplanes. The pilot had logged about 2,000 hours of night flying time and about 800 hours of time flying in instrument weather conditions.

During the preceding 24-hour, 30-day, and 90-day period, the pilot had flown the Cessna 208 for 2, 36, and 100 hours, respectively. Also, during the preceding 90 days the pilot had flown about 25 hours at night. The operator's flight time records indicated that during the 30-day period which preceded the crash, the pilot had flown the accident airplane between Flagstaff and Phoenix over 34 times.

Family members reported that the pilot only flew airplanes for the operator, and recently he only flew Cessna 208s. The pilot resided near Flagstaff, and he was extremely familiar with the terrain which surrounded the airport.

**AIRPLANE INFORMATION**

Refueling.

The airplane was manufactured in 1990, and it was equipped with 2 wing fuel tanks, each having a usable capacity of 165 gallons. In preparation for takeoff, around 1730, the airplane was fueled with 40.0 gallons of jet A fuel (20 gallons per tank), which increased the total fuel load to approximately 148 gallons (1,006.4 pounds).

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**Narrative** (Continued)**Weight.**

The maximum certificated airplane weight for flight into known icing conditions with the cargo pod installed was 8,550 pounds. On takeoff, the airplane's estimated gross weight was 7,963 pounds which included a cargo load of about 2,211 pounds.

**Takeoff Distance.**

Based upon Cessna and Federal Express supplied data and calculations, projections were made to determine the takeoff distance (required runway length) and the approximate altitude the airplane could have attained upon passing the end of the runway (assuming no snow). The airplane, as loaded, was calculated to have been able to climb to between 100 and 200 feet above the surface upon passing the runway end.

**Flight Path Data.**

Additional calculations were performed to determine the required rate of turn (degrees per second) necessary to arrive at the accident site assuming utilization of a normal departure climb speed profile and witness described flight path. After takeoff, an airplane commencing a left turn at an approximate rate between 3 and 6 degrees per second could arrive in the vicinity of the crash site while flying in an arc consistent with the accident airplane's observed flight path.

**Maintenance.**

The airplane's routine maintenance records, including engine condition trend monitoring/performance data, and nonroutine records involving avionics discrepancies, engine exceedences, and repetitive write ups, etc., were reviewed by the Federal Aviation Administration (FAA). No irregularities pertinent to the accident flight were identified.

The airplane's flight record logbook was recovered from the accident site. A review of the logbook revealed no evidence of pertinent squawks or deferred items.

**Fuel System Operation and Warnings.**

The following statement was contained in the Cessna 208B Caravan Information Manual: "Before refueling, or when the airplane is parked on a slope, turn off one of the fuel tank selectors. . . ."

The Information Manual provided pilots with the following instructions regarding fuel unbalance situations: "Fuel unbalance should be monitored to assure it does not exceed 200 pounds. . . . If fuel unbalance approaching 200 pounds does occur, the fuel tank selector for the tank with less fuel should be turned OFF until the tanks become balanced. With one fuel tank selector OFF and fuel remaining in the tank being used less than approximately 25 gallons, the FUEL SELECT OFF annunciator will illuminate and a warning horn will be activated." The airplane is placarded with the following statement: "MAXIMUM FUEL UNBALANCE IN FLIGHT: 200 LBS."

The Information Manual stated the following regarding the Fuel Selectors Off Warning System: "A fuel selectors off warning system is incorporated to alert the pilot if one or both of the fuel tank selectors are left in the OFF position inadvertently. The system includes redundant warning horns, (and) a red annunciator light labeled FUEL SELECT OFF. . . ."

In pertinent part, the system functioned as follows: "(1) If both the left and right fuel tank shutoff valves are closed (fuel tank selectors in the OFF position), the red FUEL SELECT OFF annunciator illuminates and one of the fuel selector off warning horns is activated; (2) During an engine start operation (STARTER switch in START or MOTOR position) with either the left or right

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**Narrative** (Continued)

fuel tank shutoff valves closed, the red FUEL SELECT OFF annunciator illuminates and both of the fuel select off warning horns are activated; (3) With one fuel tank selector OFF and fuel remaining in the tank being used less than approximately 25 gallons, the FUEL SELECT OFF annunciator illuminates and one of the fuel selector off warning horns is activated."

Regarding taking off with both of the airplane's fuel selectors in the off position, the Information Manual stated that "there is only enough fuel in the reservoir for approximately 1-1/2 minutes of engine operation at maximum continuous power after illumination of the RESERVOIR FUEL LOW annunciator."

**Flight Into Icing Conditions.**

The airplane was certificated and equipped for flight into known icing conditions. In pertinent part, the Information Manual stated the following:

"The in-flight ice protection equipment was not designed to remove ice, snow, or frost accumulations on a parked airplane sufficiently enough to ensure a safe takeoff or subsequent flight. Other means (such as . . . approved de-icing solutions) must be employed to ensure that all wing, strut, landing gear, cargo pod, tail, control, propeller, and windshield surfaces and the fuel vents are free of ice, snow, and frost accumulations, and that there are no internal accumulations of ice or debris in the control surfaces, engine intakes, pitot-static system ports, and fuel vents prior to takeoff."

**Airplane Deice Program.**

Empire Airlines had an FAA Approved Part 135 deice program in place for the operation of its Caravans. In brief, the program indicated that the pilot-in-command was responsible for deciding when deicing or anti-icing was necessary, and for coordinating with local facilities for its accomplishment.

In the program, deicing was defined as "a procedure by which ice, frost or snow is removed from the aircraft in order to provide clean, aerodynamically correct surfaces." Anti-icing was defined as "a procedure which provides protection against formation of frost or ice and accumulation of snow or slush on clean surfaces of the aircraft for a limited period of time. . . ."

The program indicated that ". . . when snow . . . is falling, deicing should be accomplished as close to departure time as possible. Also, when moderate-to-heavy snow is falling at departure time, it may be necessary to perform a two step procedure. After the initial deicing is accomplished, a second fluid application may need to be applied in order to maximize protection.

Regarding ice removal, the program indicated that when wet snow is falling, anti-icing solution should be applied to the entire airplane if the airplane will not depart within 15 minutes. Empire Airlines had a policy of not deicing its Caravans with the engine running.

To additionally ensure that the airplane was free of contamination, pilots were provided with the following guidance regarding performance of a pretakeoff check: "This check of the representative surface(s) is made by the pilot from the cockpit within five minutes of takeoff any time there is a threat of contamination. If contamination is sticking to the representative surface(s) the airplane should be deiced again before takeoff. The representative surface of the Caravan is the upper surface of the wing-mounted radar pod."

**METEOROLOGICAL INFORMATION****Weather Briefings.**

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**Narrative** (Continued)

At 1236, the pilot received a direct user access system (DUAT) weather briefing for a proposed 1 hour 10 minute flight between Phoenix and Flagstaff. The proposed departure time was 1600. At 1255, the pilot received an abbreviated weather briefing from the Prescott Flight Service Station for a proposed round trip flight between Phoenix and Flagstaff. The proposed return trip departure time out of Flagstaff was 1800. Regarding the forecast for Flagstaff weather, the briefer made the following statement to the pilot: ". . . up until four o'clock (2100 mst) they're forecasting ceilings two hundred overcast winds two two zero at ten occasional two hundred scattered ceiling seven hundred broken visibility three miles light rain light snow and fog. . . ."

At 1304, the pilot received another DUAT weather briefing for a proposed flight between Phoenix and Flagstaff.

**Airplane Ice/Snow.**

Several witnesses observed N746FE prior to its departure. Empire Airlines and Federal Express personnel reported that the pilot did not make a request to have the airplane deiced, and none reported observing any ice or snow on the airplane.

One of the witnesses reported that around 1730 the airplane had just finished being refueled and was parked outside on the ramp. By 1744 the cargo loading operation had been completed, and the witness moved his truck away from the airplane. A minute later, the airplane taxied away. The witness further reported "it was snowing a heavy wet snow which was accumulating on the trucks." Another witness reported that while the airplane was waiting for takeoff "the snowfall increased (wet & heavy)." Still another witness reported that while waiting for the airplane to takeoff, "the snow was coming down heavily." This witness also reported that just before the airplane departed he returned to his vehicle and observed a lot of slush on it.

The Beech King Air pilot reported that about 1800 he taxied from a warm hanger to takeoff on runway 03. The pilot made the following written report regarding his observations of the snow: "Initially it was snowing heavily with big wet snowflakes. The snow on my aircraft was accumulating only on the outboard wing panels (outboard of the prop blast and appeared to be melting and running off. It seems we waited for our clearances for a long time. I am going to estimate a 15 minute wait. Toward the end of the wait for clearance the snow fall changed to small dry snowflakes and the visibility improved."

**Flagstaff Weather.**

An automated surface observing system (A02A) was installed at the Flagstaff Airport which recorded the local weather at 5 minute intervals. According to the A02A reports, around 1715 the temperature dropped from 35 to 34 degrees Fahrenheit, and a light snow began falling. Around 1755 the temperature lowered to 33 degrees F. The snow continued until after the accident.

The local air traffic controller reported to the Safety Board that at 1746 it was snowing when he cleared N746FE to taxi for takeoff. Thereafter, the controller observed the airplane taxi past the tower and recalled that it was still snowing.

At 1801:21, the controller made the following statement to N746FE regarding the weather: "Empire five fifty-one flagstaff weather zero zero five six observation (1756 mst) measured ceiling two hundred broken one thousand overcast visibility three quarters of a mile with light snow and fog." The pilot acknowledged the report.

**AIDS TO NAVIGATION, COMMUNICATIONS, AND SERVICES**

According to FAA records of facility operations, all electronic aids to navigation pertinent to the airplane's route of flight were functional in the vicinity of the Flagstaff airport.

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**Narrative (Continued)**

The FAA reported that all communications and services provided to the pilot were normal. There were no impairments of its ground-to-air communications.

**AIRPORT FACILITIES**

The Flagstaff Pulliam Airport's elevation is 7,011 feet msl. Runway 21 is 6,999 feet long.

**FLIGHT RECORDERS**

The airplane was not equipped with a flight recorder. However, on October 7, 1994, at an aircraft total time of 2,297.4 hours, a "Power Analyzer & Recorder" (PAR) performance computer was installed in the belly of the fuselage, and it was functionally checked and calibrated.

The PAR recorded specific parameters of normal engine and airplane operation in addition to exceedences of, for example, engine torque, interstage turbine temperature, propeller and compressor speed, and airspeed. It also recorded external data such as outside air temperature and event times. The PAR was recovered intact from the crash site, and all stored data was extracted.

An examination of the PAR data indicated that, in part, at 1745:06 the airplane's engine was started. (The PAR clock was synchronized to the airplane's instrument panel clock.) At that time, the outside air temperature (OAT) was -1 degree Celsius (30.2 degrees Fahrenheit), and the airplane's indicated airspeed (IAS) was 0 knots.

The next (and final) recorded event occurred during flight at 1803:23, when power to the PAR was interrupted (terminated), and data was automatically captured. In part, the data included the following information: OAT -2 degrees Celsius (28.4 degrees Fahrenheit); IAS 61 knots; and propeller rotational speed (NP) 1320 RPM. No exceedences were recorded during the accident flight.

**WRECKAGE AND IMPACT INFORMATION**

From an examination of the accident site, airplane wreckage, and witness statements, the airplane was found to have collided with trees and terrain about 1.41 nm south (165 degrees, magnetic) of the center of the Flagstaff Airport. The main wreckage was located approximately 35 degrees, 6 minutes, 54 seconds north latitude, by 111 degrees, 40 minutes, 12 seconds west longitude. The estimated crash site elevation was between 6,950 and 7,000 feet msl.

Portions of fragmented airplane structure and severed tree limbs/trunks were observed leading to the main wreckage along a magnetic track of about 050 degrees. The initial point of tree impact (IPI) was noted by the presence of a severed tree limb, and about 60 feet northeast a 4-foot-long wing section was found in a tree.

Along the initial wreckage path, the lateral distance between severed tree limbs appeared consistent with the 52-foot-long lateral distance between the airplane's wingtips. The distance was consistent with impact by the airplane in a near wings level flight attitude.

Additional wing sections, the right wing lift strut, and the radar dome were found between 99 and 306 feet to the northeast of the IPI. The main wreckage was found about 418 feet from the IPI. Over half dozen 25- to 50-foot-tall trees having 1-foot diameters were observed felled at the site. There was no evidence of fire.

**Airframe Examination.**

All of the airplane's flight control surfaces, and the majority of the wing and tail structure were located in the vicinity of the main wreckage area. The cockpit was found at ground level,



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partially upside down, and on a magnetic heading of 045 degrees. The measured right bank angle of the fuselage was 128 degrees, and the nose-down pitch attitude was 27 degrees.

The leading edges of the wings and horizontal stabilizer bore impact signatures in an aft direction which appeared consistent with the surrounding felled trees. No evidence was observed of any preimpact failure of the flight control system.

The fuselage was observed circumferentially broken open in the area behind the cargo door and forward of the beginning of the dorsal fin. This area was in the vicinity of the attachment point for the emergency locator transmitter (ELT). The aft portion of the fuselage was found pointed in a nearly vertical downward direction, and was observed rotated about 90 degrees from the remainder of the fuselage (see photographs).

**Engine Examination.**

The engine was found intact, and oil was present in the main oil filter assembly. The gas generator was observed to rotate freely, and continuity was established with the accessory gearbox.

No engine case penetration was observed. The propeller shaft was rotated, and continuity was established with the gear train for the power section mounted accessories.

Fuel was found in the fuel line connected to the high pressure fuel pump, and in the engine driven fuel pump. The fuel pump filter was found clean.

**Propeller Examination.**

The propeller assembly was located several feet below ground level, adjacent to the main wreckage, and was broken off from the engine. The propeller assembly retaining bolts were observed stripped from the mounting attachment hub and had remained with the engine propeller shaft. The three propeller blades were found attached to the hub/spinner. The blades were observed torsionally deformed, one was bent into an "S" shape, and all of the blades bore abrasions/scratches in a chordwise direction over their cambered surface.

**Checklist.**

The Cessna Caravan, Model 208B, "Pilot's Checklist" (booklet) was recovered from the airplane wreckage. Pages in the booklet were observed held together with a plastic spiral binder. The booklet contained major sections which were entitled: "Normal Procedures, Systems Checks, Emergency Procedures, and Performance."

The booklet, which was designed with tabs for quick opening/ reference was found opened to the red color tabbed section entitled "EMERGENCY PROCEDURES," between page numbers E-14 and E-17. Pages E-15 and E-16 were observed ripped in half, and the bottom portion of these pages were not located.

Pages E-15/16 were observed soiled. The adjacent pages (E-14 and E-17) were also observed soiled, but to a lesser degree. Other pages in the booklet were not noticeably soiled.

The following main section titles appeared in capital letters on the referenced pages:

Page E-14.                      Engine Malfunctions                      Fuel System Malfunction/Inadvertent  
Fuel Flow Interruption Procedures

Page E-15.                      (continuation of page E-14)

Page E-16.                      Flap System Malfunction Procedures

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**Narrative** (Continued)

Page E-17. Landing Gear Malfunction Procedures

**MEDICAL AND PATHOLOGICAL INFORMATION**

Family members and operator employees reported that the pilot appeared to have been in good health within several days of the accident. In particular, prior to departing from Flagstaff the pilot did not appear ill.

On January 13, 1995, an autopsy was performed on the pilot by the Office of the Coconino County Medical Examiner, 2500 North Fort Valley Road, Flagstaff, Arizona.

Results of toxicology tests performed by the FAA were negative for ethanol and all screened drugs.

**SURVIVAL ASPECTS**

An extensive search was initiated within minutes of the airplane's failure to return to the Flagstaff Airport. The Coconino County Sheriff's Department declared that the search effort be called a major incident, and additional resources were requested and received. Search and rescue personnel and equipment were utilized from the following additional organizations: Civil Air Patrol, Arizona Departments of Public Safety and Game & Fish, Flagstaff Police & Fire Departments, Flagstaff Airport, Federal Express, and Empire Airlines. No signal from the airplane's ELT was received.

The airplane wreckage was located around 0815 the following morning. The pilot was found inside the partially upside-down cockpit, and was restrained by his seat belt/harness assembly. The Coconino County Medical Examiner reported that the cause of death was multiple traumatic injuries due to impact.

**ELT Airframe Mount Location and Failure Information.**

Cessna reported that, when it manufactured the airplane, it installed the Pointer Model 3000 ELT behind the aft cabin partition wall on the right-hand side of the tailcone. The ELT was found at this location in the accident airplane.

During the wreckage examination, the ELT transmitter box was found separated from its airframe attachment mounting bracket. The ELT transmitter was located in the snow-covered hillside between 10 and 15 yards from the main wreckage. The ELT antenna remained attached to its airframe mount.

**TESTS AND RESEARCH**

The ELT, manufactured in 1990 by Pointer, Inc., had been installed into the Caravan along with Pointer's airframe assembly attachment mounting bracket. Pointer examined the ELT assembly. Pointer verbally reported finding no evidence that either the ELT or its airframe attachment bracket had been modified since having been factory installed.

Pointer reported finding no evidence of preimpact failure of either the transmitter box housing or the associated airframe mounting bracket. Also, no evidence was found indicating the ELT had been improperly installed or secured to the airframe structure. Pointer opined that the ELT transmitter box had evidently departed from its mounting bracket upon being subjected to impact loads which exceeded the design strength of the bracket.

Pointer further reported that the ELT did not transmit a distress signal because of the internal failure of its 121.5 Mhz quartz crystal. The crystal's failure appeared to have been impact



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related.

An additional examination was performed on the ELT attachment mounting bracket. Pointer opined that the observed inward deformation (curl) to the bracket's side structure was indicative of the bracket having been impacted by an (unidentified) airframe component, or possibly by cargo or some other structure, following dislodgment of the ELT box.

**Engine Teardown Examination.**

The Transportation Safety Board of Canada oversaw the engine teardown examination and reported finding no discrepancies. Regarding signatures indicative of the existence of engine power, the Transportation Safety Board indicated finding sufficient rub marks with corresponding evidence of frictional heat discoloration to indicate that power was being generated at impact, but at an unknown level. The engine controls and accessories were also disassembled, and no anomalies affecting normal operation were noted.

Pratt & Whitney of Canada provided a teardown report and summary statement indicating the following findings and conclusions: The engine displayed moderate impact damage including light compressional deformation of the gas generator case. Strong circumferential rubbing and machining were displayed by the compressor turbine disc and the power turbine guide vane ring due to axial contact under impact loads and external case distortion. The power turbine disc and interstage baffle, and the power turbine blade tips and shroud, displayed strong circumferential rubbing and machining due to radial contact under impact loads and external case distortion. There were no indications of any operational distress or dysfunction to any of the engine components examined that would preclude normal operation. In conclusion, the engine displayed rotational signatures to the internal components characteristic of the engine developing power at impact, likely in a high power range.

**Propeller Teardown Examination.**


The FAA oversaw the propeller teardown examination conducted by the McCauley Accessory Division of the Cessna Aircraft Company. During the teardown, various damage signature marks on components were accessed to determine blade pitch settings and an indication of power at impact. McCauley reported that the impact signature marks found on the blade butts and the counterweight impact mark were indicative of the blades being at an angle of at least 15 to 17.5 degrees at impact. As designed, the low pitch (low power) blade angle on the installation was 11.1 degrees. Therefore, "if the accident aircraft were operating at a relatively low speed at impact, a blade angle finding of 15 to 17.5 degrees would indicate that the propeller was governing above the low pitch stop position and was being operated with power. . . ."

In summary, McCauley reported that the overall blade bending, twisting, and impact mark signatures indicated the propeller was likely rotating under high power at impact. There were no indications of any type of preimpact propeller failure.

**Annunciator Panel Examination.**

The impact damaged annunciator panel was removed from the wreckage and was examined by the Safety Board's Materials Laboratory Division, Office of Research and Engineering, Washington, D.C. The examination was performed to ascertain the status of various airplane systems as reflected by the illumination of annunciator lights.

In summary, the panel was found composed of 24 indicator units, each with two light bulbs. Seven of the 24 individual indicator units were missing in their entirety. The face plates from five additional units were also missing.

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The filaments from each of the light bulbs in the indicator units were examined for evidence of stretching. Evidence of stretching was noted in at least one of the bulb filaments from the following units: IGNITION ON, VOLTAGE LOW, STANDBY ELECTRICAL POWER ON, FUEL SELECT OFF, and BATTERY HOT.

No observations were made regarding the filament status of the bulbs in the Emergency Power Lever indicator unit. Neither of those filaments were located.

The Cessna Aircraft participant reported that due to an on-going service test being conducted which utilized a battery having a design different than the original battery, the electrical circuits to the annunciator panel "Battery Hot" (and "Battery Overheat") lights had been disconnected at the battery end.

## Audio Tape Recording Examination.

The Safety Board's Engineering Services Division Laboratory examined background sounds recorded by the Flagstaff Air Traffic Control Tower on its communications tape between its facility and the accident pilot. The examination revealed the presence of an intermittent sounding horn during the last minute of flight when the pilot made several transmissions on the local tower frequency.

Specifically, during the pilot's transmission of "Five fifty-one's coming back in" which started at 1803:57, eight beeps, 0.2 seconds apart, at a frequency of 2,800 Hz, were detected.

At 1804:03, during the pilot's transmission of "I'm coming back to the airport," six beeps, 0.2 seconds apart, at a frequency of 2,800 Hz, were detected. No beep sounds were heard during the pilot's next transmission of "No but I've got to get back," which lasted 1.1 seconds.

Empire Airlines personnel tested a similar model Caravan at the Flagstaff Airport. During the test, they listened to the warning horns in the airplane, and compared the horns to the horn noise which was heard transmitted as a distinctive background sound on the rerecorded Flagstaff Tower tape of the accident flight. Empire Airlines opined that the background noise heard on the tape during the pilot's transmissions corresponded to the FUEL SELECTOR OFF warning horn.

Participants from Cessna verbally reported that the horn sounds, which they also heard on the tape, closely matched the prescribed frequency of the FUEL SELECTOR OFF warning horns in other similar model Caravans. Cessna further reported that the dual horn sounds on the tape matched the condition wherein both fuel selectors were set to the OFF position.


## ADDITIONAL INFORMATION

The Pratt & Whitney Engine and McCauley propeller were verbally released to the operator upon completion of the teardown examinations on February 3 and 20, 1995, respectively. The main airplane wreckage was verbally released to the operator on February 10, 1995. The cockpit annunciator panel, ELT transmitter, antenna and mounting assembly, and the PAR computer were released on December 4, 1995. No parts or records were retained.

## Additional Participants.


The following additional persons/organizations participated in the investigation:


Steven E. Leeper	Federal Aviation Administration,	WP-FSDO-SDL
Paul Crosby	United Technologies Pratt & Whitney	Canada Services, P.O.
Box 270,	Farmington, NM 87499	


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**Narrative** (Continued)

Gregory P. Young	Pratt & Whitney				
Al L. Folsom,	Empire Airlines	Thomas J. Kammers	"	" Lanson Unruh	" "
Francis Defelre	"	"			
Walter M. Kuemmerle	Federal Express	Bruce Erickson	"	" Ted Elwell	" "
John Musa	"	" Wayne Gelfand	"	"	

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		Occurrence Type: Accident				
Landing Facility/Approach Information						
Airport Name FLAGSTAFF PULLIAM		Airport ID: FLG	Airport Elevation 7011 Ft. MSL	Runway Used 21	Runway Length 6999	Runway Width 150
Runway Surface Type: Asphalt						
Runway Surface Condition: Snow--wet						
Type Instrument Approach: NONE						
VFR Approach/Landing: Precautionary Landing						
Aircraft Information						
Aircraft Manufacturer CESSNA		Model/Series 208B		Serial Number 208B0236		
Airworthiness Certificate(s): Normal						
Landing Gear Type: Tricycle						
Homebuilt Aircraft? No		Number of Seats: 2	Certified Max Gross Wt. 8550 LBS	Number of Engines: 1		
Engine Type: Turbo Prop		Engine Manufacturer: P&W	Model/Series: PT6A-114A	Rated Power: 675 HP		
- Aircraft Inspection Information						
Type of Last Inspection AAIP		Date of Last Inspection 12/02/1994	Time Since Last Inspection 40 Hours	Airframe Total Time 2439 Hours		
- Emergency Locator Transmitter (ELT) Information						
ELT Installed? Yes		ELT Operated? No	ELT Aided in Locating Accident Site?			
Owner/Operator Information						
Registered Aircraft Owner  FEDERAL EXPRESS CORPORATION		Street Address 3101 TCHULAHOMA				
		City MEMPHIS	State TN	Zip Code 38118		
Operator of Aircraft  EMPIRE AIRLINES, INC.		Street Address 11101 AIRPORT DRIVE				
		City HAYDEN	State ID	Zip Code 83835		
Operator Does Business As:			Operator Designator Code: COEA			
- Type of U.S. Certificate(s) Held:						
Air Carrier Operating Certificate(s): Supplemental; On-demand Air Taxi						
Operating Certificate:			Operator Certificate:			
Regulation Flight Conducted Under: Part 135: Air Taxi & Commuter						
Type of Flight Operation Conducted: Unknown						

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>			NTSB ID: LAX95FA076																																																																																			
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<b>First Pilot Information</b>																																																																																						
Name On File			City On File		State On File	Date of Birth On File	Age 59																																																																															
Sex: M	Seat Occupied: Left		Principal Profession: Civilian Pilot			Certificate Number: On File																																																																																
Certificate(s): Airline Transport; Flight Instructor																																																																																						
Airplane Rating(s): Multi-engine Land; Multi-engine Sea; Single-engine Land																																																																																						
Rotorcraft/Glider/LTA: None																																																																																						
Instrument Rating(s): Airplane																																																																																						
Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine																																																																																						
Type Rating/Endorsement for Accident/Incident Aircraft? Yes					Current Biennial Flight Review?																																																																																	
Medical Cert.: Class 2		Medical Cert. Status: Valid Medical--w/ waivers/lim.			Date of Last Medical Exam: 01/24/1994																																																																																	
<table border="1"> <thead> <tr> <th rowspan="2">- Flight Time Matrix</th> <th rowspan="2">All A/C</th> <th rowspan="2">This Make and Model</th> <th rowspan="2">Airplane Single Engine</th> <th rowspan="2">Airplane Multi-Engine</th> <th rowspan="2">Night</th> <th colspan="2">Instrument</th> <th rowspan="2">Rotorcraft</th> <th rowspan="2">Glider</th> <th rowspan="2">Lighter Than Air</th> </tr> <tr> <th>Actual</th> <th>Simulated</th> </tr> </thead> <tbody> <tr> <td>Total Time</td> <td>10000</td> <td>2000</td> <td>3650</td> <td>6350</td> <td>2000</td> <td>800</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Pilot In Command(PIC)</td> <td>7500</td> <td>2000</td> <td></td> <td></td> <td>2000</td> <td>800</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instructor</td> <td>1400</td> <td>150</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 90 Days</td> <td>100</td> <td>100</td> <td>100</td> <td></td> <td>25</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 30 Days</td> <td>36</td> <td>36</td> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 24 Hours</td> <td>2</td> <td>2</td> <td>2</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>								- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air	Actual	Simulated	Total Time	10000	2000	3650	6350	2000	800					Pilot In Command(PIC)	7500	2000			2000	800					Instructor	1400	150									Last 90 Days	100	100	100		25						Last 30 Days	36	36			15						Last 24 Hours	2	2	2		1					
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Last 24 Hours	2	2	2		1																																																																																	
Seatbelt Used? Yes		Shoulder Harness Used? Yes			Toxicology Performed? Yes		Second Pilot? No																																																																															
<b>Flight Plan/Itinerary</b>																																																																																						
Type of Flight Plan Filed: IFR																																																																																						
Departure Point		State		Airport Identifier		Departure Time		Time Zone																																																																														
Same as Accident/Incident Location				FLG		1802		MST																																																																														
Destination		State		Airport Identifier																																																																																		
PHOENIX		AZ		PHX																																																																																		
Type of Clearance: IFR																																																																																						
Type of Airspace: Class D																																																																																						
<b>Weather Information</b>																																																																																						
Source of Briefing: Commercial Weather Service; Flight Service Station																																																																																						
Method of Briefing:																																																																																						

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>			NTSB ID: LAX95FA076		
			Occurrence Date: 01/11/1995		
			Occurrence Type: Accident		


<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
FLG	1756	MST	7011 Ft. MSL	2 NM	346 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown				0 Ft. AGL	Condition of Light: Night/Dark
Lowest Ceiling: Broken			200 Ft. AGL	Visibility: 0.75 SM	Altimeter: 29.00 "Hg
Temperature: 33 °C		Dew Point: 32 °C	Wind Direction: 200		Density Altitude: Ft.
Wind Speed: 5		Gusts:	Weather Conditions at Accident Site: Instrument Conditions		
Visibility (RVR): 0 Ft.		Visibility (RVV) 0 SM	Intensity of Precipitation: Light		
Restrictions to Visibility: Fog					
Type of Precipitation: Snow					

<b>Accident Information</b>					
Aircraft Damage:		Aircraft Fire:		Aircraft Explosion	
Classification:					

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot	1				1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -	1				1
Other Ground	0	0	0		0
- GRAND TOTAL -	1	0	0		1

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	Occurrence Date: 01/11/1995	
	Occurrence Type: Accident	
Administrative Information		
Investigator-In-Charge (IIC) WAYNE POLLACK		
Additional Persons Participating in This Accident/Incident Investigation:  ARLAN R ALLEN WP-FSDO-SDL 15041 N AIRPORT DR SCOTTSDALE, AZ 85260  M.E. (MEL) SPELDE EMPIRE AIRLINES 11101 AIRPORT HAYDEN LAKE, ID 83835  FRANK A WALSH FEDEX 2837 SPRANKEL MEMPHIS, TN 38118  EMILE J LOHMAN CESSNA P.O. BOX 7704 WICHITA, KS 67277		
FACTUAL REPORT - AVIATION		